cent. in February, 1906, and at no time since has it fallen below 22.2 per cent.

The percentage of samples containing fewer than 50,000 has never fallen below 50 since September, 1905, three months after inspection work began.

Experiments on the Germicidal Action of Fresh Cow's Milk: P. G. Heinemann.

The question whether fresh cow's milk contains bactericidal substances or not has been answered in the affirmative by Fokker, Ehrlich and Brieger, Park, Kolle and his coworkers, Hunziker, Hippius, Koning, and others. In opposition to this, Moro, Honigmann, Basenau, Stocking and others have denied the existence of such substances.

Experiments by the writer carried on by inoculating raw milk and milk heated to 56° C. and to the boiling point indicate that fresh cow's milk contains germicidal substances, although to a smaller degree than blood serum. Milk was obtained directly after milking and divided into three portions, one of which was heated either to boiling or kept at 56° C. for 30 minutes. The second part was left without further treatment, and then both heated and raw milk were inoculated with suspensions of bacterial cultures. The third part was kept as control. Plates were prepared from suitable dilutions and the colonies counted after two days incubation at 37° C. The three lots of milk were kept at room temperature and plating repeated at regular intervals. The results lead to the following conclusions:

Conclusions.—1. Raw milk contains substances which are germicidal to a pronounced degree for some species of bacteria. (*B. coli, B. dysenteriæ* (Flexner), *B. fluorescens, non-liquefaciens.*)

2. Raw milk contains substances which have slight germicidal action on some species of bacteria. (*B. violaceus, B. cholerœ suis, B. prodigiosus* (laboratory culture), and some saprophytes isolated from milk.)

3. The germicidal substances in milk do not act strongly on *B. fluorescens liquefaciens, B. typhosus,* some varieties of *B. prodigiosus* and *B. proteus,* but the multiplication of these organisms is restrained for a limited period.

4. The germicidal action of cow's milk persists for more than 5 hours and less than 7 hours at room temperature.

5. The germicidal action of cow's milk is destroyed by keeping milk at 56° C. for 30 minutes or by heating to the boiling point.

6. The germicidal substances in cow's milk are less powerful than those of blood serum, but are inactivated under similar conditions. The relative concentration of these substances varies in milk from different animals.

S. C. Prescott,
Secretary

SCIENTIFIC BOOKS

Experimentelle Beiträge zur Morphologie. Hefte I. and II. Herausgegeben von Herman Braus (Heidelberg). Leipzig, W. Engelmann. 1906.

The study of experimental morphology, which in recent years has attracted so large a body of enthusiastic students, has been taken up very largely from the dynamic or physiological point of view. This is indicated by the title of the journal most specifically devoted to this line of work—W. Roux's 'Entwicklungsmechanik der Organismen.' Yet, although some physiologists, like Pflüger and Loeb, have done much to stimulate interest in this direction, it is chiefly to professional zoologists and anatomists that the subject has appealed, while the immediate predecessors and many of the contemporaries of these same zoologists and anatomists have been interested rather in phylogenetic and historical than in dynamic biological questions.

The purpose of these Beiträge is to emphasize the value of experimental and accidental

teratology for the elucidation of phylogenetic morphological problems. This purpose is set forth in the paragraph which concludes a preface to the Beiträge in which Braus dwells on the distinctions between the historico-genetic and the dynamic aspects of biological problems. "The close relations," he says, "of this branch of experimental embryology to the program of 'Gegenbaur's Morphologisches Jahrbuch' led me, by agreement with the editor and publisher of this journal, to embody my 'Experimentelle Beiträge zur Morphologie' in it and thus to certify their appurtenance to the life work of the founder of modern morphology. On the other hand, in order to emphasize the unity of purpose of the 'Experimentelle Beiträge' and to make them more readily accessible to those who care especially for the broad aspects of experimental embryology and for its relations to the physiology of development, the Beiträge following their appearance in the Jahrbuch are to brought out in the form of separate Hefte. It is anticipated that several Hefte can be bound into a volume. Should they grow in general into a collection for experimental-embryological work which has the historic-morphological problem as its aim, yet in which sight is never lost of the relations of the facts discovered to the other aspect of biological investigation, that of the physiology of development, there may be added other volumes to the series and the progress here aimed at may prove lasting."

Thus far two Hefte have appeared. These contain reprints from the *Morphologisches Jahrbuch* of articles on experimental embryology and teratology by Braus and one of his pupils. Bd. I., Heft 1, is given up to the preface above mentioned, and to a paper entitled 'Ist die Bildung des Skeletes von den Muskelanlagen abhängig.' A series of experiments on the developing pectoral fin of sharks leads Braus to conclude that in the selachian fin the skeleton develops independently of the musculature but that parts of the skeleton are dependent upon other parts for stimulus to development.

In Bd. I., Heft 2, there is an article by O. Bender entitled 'Zur Kenntnis der Hypermelie beim Frosch.' This gives a description of the external form and of the skeletal muscles and nerves of a left supernumerary hind leg of a frog. Deductions are drawn as to the probable cause of the anomaly.

The chief paper in this Heft is one by Braus on the 'Vordere Extremität und Operculum bei Bombinatorlarven' in which Braus shows that although normally the fore limb at a certain stage of development appears to break through the operculum yet, if no fore-leg is developed, there is none the less an aperture formed as if the leg were present. The developing limb has the power to force its way through a covering of skin artificially formed above it. The results of the experiments are considered from the point of view of phylogenetic morphology.

All anatomists acknowledge the great help which the study of normal embryology has been in the development of a science of structural form. That accidental and experimentally produced abnormality of structure may help to clear up obscure fields of anatomy has been abundantly proved of late years. Abnormalities and variation in the structure of man and some other animals have long been used as a basis for phylogenetic speculation. It is not improbable that teratology controlled through experiment may throw interesting light on this aspect of biology. We trust that the 'Beiträge' may serve to stimulate more work in experimental embryology in its morphological aspects. On the other hand, it is to be hoped that vague speculation will not take up an undue amount of the pages devoted to the subject. C. R. B.

Rhythmical Pulsations in Scyphomedusæ. By ALFRED G. MAYER, Director of Department of Marine Biology of the Carnegie Institution of Washington, Tortugas, Florida. Pp. 62, with 2 plates and 36 text figures. Washington, D. C. The Carnegie Institution. 1906.

Among the wealth of new material for investigation which the Carnegie Station at Tortugas has placed at the disposal of the scientific public Dr. Mayer has discovered that a small scyphomedusæ, *Cassiopea xamachana*,